

too great to mention. He served during the campaign of 1866 and the war of 1870-71, and obtained the decoration of the iron cross. His death is a great loss to physiology, and will be felt as a personal sorrow by physiologists throughout the world.

LAUDER BRUNTON.

NOTES.

WE regret to announce the death on June 6, at seventy-eight years of age, of Prof. Adolph Lieben, emeritus professor of general and pharmaceutical chemistry in the University of Vienna, and foreign member of the Chemical Society.

THE death is announced, in his seventy-first year, of Dr. Barclay V. Head, correspondant of the Institute of France, corresponding member of the Royal Prussian Academy of Sciences, and keeper of the Department of Coins and Medals at the British Museum in 1893-1906.

PORTSMOUTH has been selected as the place of meeting for the autumn conference of the Institute of Metals. The conference, which will be presided over by the president, Sir Henry J. Oram, K.C.B., F.R.S., will be held on Thursday, September 10, and Friday, September 11, in the Municipal College, a number of important papers being read each morning.

THE annual June conversazione of the Royal Society was held at Burlington House on Tuesday. Most of the exhibits of apparatus and specimens were the same as were shown at the May conversazione, of which an account was given in NATURE of May 21 (p. 304), and others have been described in our reports of the proceedings of societies and academies, so that no further reference need be made to them here.

THE Aero Club of America has appointed a committee of seventy, with Admiral Peary as its chairman, to supervise the preparation of a map of the permanent air currents over the United States. The committee will begin by formulating rules for making aerial observations at points to be agreed upon in various parts of the country. Local aero clubs will then make the observations by means of balloons and aeroplane flights. The committee will also prepare a topographical map indicating convenient landing places for airmen.

A SERIES of severe thunderstorms passed over the southern area of the metropolis on Sunday afternoon, June 14. The lightning was exceptionally severe and prolonged, and torrents of rain fell with much hail at times. Six persons, of whom four were children, were killed at about one o'clock, whilst sheltered under two different trees on Wandsworth Common, and several persons were injured, one of whom has since died. Many buildings were struck by lightning, and immense damage was sustained by flooding due to the heavy rain. The damage was almost wholly limited to an area stretching from east to west, from Blackheath and Lewisham through Streatham and Wandsworth to Wimbledon and Kingston. At Streatham Hill thunder was first heard at 12.30 p.m., and the

storms continued with more or less intensity until after 5 p.m. There were four distinct disturbances moving from east to west, and apparently subsidiary to the low-pressure area over France and Germany. The heaviest downpour of rain and hail occurred at Streatham Hill for a quarter of an hour, from 1.30 p.m.; at 2 p.m. the rainfall measured 1.10 in., at 4 p.m. an additional 0.45 in., and at 6 p.m. 0.05 in., giving an aggregate 1.60 in. At Wandsworth Common the rainfall by 3 p.m. measured 1.23 in., and at 4.30 p.m. an additional 0.65 in. was measured, giving an aggregate 1.88 in. At Kew the rainfall was 1.34 in., at Greenwich 0.32 in., South Kensington 0.23 in., Westminster 0.16 in., Camden Square, 0.04 in., at Hampstead nil.

THE address upon the relation of science to the modern State, and the inadequate encouragement given to the scientific discoverer, delivered by Sir Ronald Ross at the annual meeting of the British Science Guild on May 22 has produced a valuable and interesting correspondence in the *Morning Post* during the past few weeks. Sir Ronald Ross's main thesis was that however good the educational and laboratory opportunities may be, discoveries are not likely to be made so frequently if they impoverish the workers, or at least confer no benefits upon them, as is the case in Great Britain at present. He also pointed to the injustice of the treatment of scientific men by the State in accepting great services with little or no compensation, whereas for far less valuable services from other professional men high fees are paid. Readers of NATURE know how persistently the claims of scientific investigation to adequate recognition have been urged in these columns, and that an article upon the subject appeared in our issue of June 4. The letters published in the *Morning Post*, most of them by well-known men of science, should be the means of making a large section of the general public acquainted with the poor prospects, measured by monetary standards or worldly success, offered by a career devoted to scientific research in comparison with those of professions which do not demand exceptional qualities of originality and genius. The State may not be able to select and endow a race of discoverers, and it cannot assess the ultimate value of a discovery, but what it can and should do is to see that the men and women who are contributing to the advancement of knowledge are given the most generous encouragement and the fullest opportunities of carrying on their work.

AMONGST the terrible loss of life in the *Empress of Ireland* disaster in the St. Lawrence River recently there comes as a shock to all geologists and mining men interested in the occurrence of ore-deposits in the Archæan crystalline rocks of Canada the loss of one who, for the past thirty years, took a most active part in the deciphering of the structure of the earth's crust in the great crystalline areas of North America. In Dr. Barlow, Canada had the last court of appeal on the genesis of its ore-deposits. Trained first at home in Montreal, Barlow studied at McGill University under Sir William Dawson, Dr. Harrington, and other geologists, and was asked to join the

technical staff of the Geological Survey in 1883 at Ottawa, under Dr. A. R. C. Selwyn. Filled with energy and enthusiasm for the science of geology, he entered the field in the province of Quebec, and later on worked hard at the nickel- and copper-bearing deposits of the Sudbury region in Ontario. In the Cobalt silver-mining areas of Ontario, throughout the Lake Timiskaming areas of crystalline rocks, in the iron-ore region of Lake Timagami, as well as in the gold-bearing areas of the Porcupine district on the Montreal River, and in the Haliburton and Bancroft region of southern Ontario, throughout the Hastings series, besides the special district of Dungannon, where corundum deposits are found, Dr. Barlow was the worker who, with unceasing energy and devotion to the solution of the difficult problems presented in these various fields, characterising nearly as many petrographical provinces, has left a record of noteworthy achievement to the science. At the March (1914) meeting of the Canadian Mining Institute, held in Montreal, he was the retiring president, and he did much for the institute and the mining fraternity to bring about close relations between the thorough-going geologist and the practical mining engineer.

THE archæological section of the Victoria Museum, Ottawa, the national museum of Canada, contains a valuable collection from the Thompson River region in the southern interior of British Columbia. In 1897, with the aid of funds contributed by Mr. Morris K. Jesup, of New York, Mr. Harlan I. Smith was enabled to make important discoveries in this little known region. The material thus obtained, which is of considerable anthropological value, has now been catalogued and described by Mr. Smith in Memoir No. 1290 of the Geological Survey of Canada. The catalogue is provided with a good series of illustrations, and is an important contribution to the ethnology of North America.

DR. ASHBY, Director of the British School at Rome, has recently delivered a lecture before the Malta Historical and Scientific Society on recent discoveries in the island. A large Roman villa has now been thoroughly examined, which shows rooms grouped round a central peristyle, with fluted columns of Malta stone, and an underground water channel leading from the great cistern of Medewiet, which was excavated in 1881. The problem of the connection of the two has not, however, been determined. Opposite the villa is the Ghar Dalam cave, the exploration of which has been resumed. On the upper layer of earth pottery, both prehistoric and Punic, was discovered, mixed with the smaller bones of hippopotami and other animals, showing that the stratification had been destroyed probably by the percolation of water through the cave, which is not very far below the surface, and is even now full of moisture. These animals lived in the island while it formed part of a larger continent, and their bones were probably washed into the cave in their present state of disorder when the continent was submerged.

MR. J. P. BUSHE-FOX reported at the last meeting of the Society of Antiquaries the results of

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excavations at Hengistbury Head, lying east of Bournemouth, and forming the south side of Christchurch Harbour. The place was occupied from Neolithic times, and interments supplied Bronze age pottery, an incense cup, gold, amber, and bronze articles. In England it had hitherto been extremely difficult to fill in the gap between the end of the Bronze age and the period immediately preceding the Roman occupation; but the discovery at Hengistbury Head of a complete series of pottery linking up with the Hallstatt and La Tène periods is of great value. Perhaps the most interesting discovery was of more than 4000 gold, silver, and bronze coins, most of them British, and a large number of new types. The coinage of Gaul and Britain was largely copied from Greek originals, principally a coin of Philip of Macedon, about the middle of the fourth century B.C. The head and chariot on this coin had become so degraded by copying that the original pattern had been entirely forgotten. Most of the Hengistbury coins belong to the last stage of this type, and many of them are covered with little more than dots and lines. With them were associated Roman coins dating as late as the middle of the second century A.D. As many of the British examples were in mint condition, this part of the country had evidently been little affected by the Roman occupation of more than a century before.

MR. CLARENCE B. MOORE records in vol. xvi. of the Journal of the Academy of Natural Sciences of Philadelphia, 1913, under the title of "Some Aboriginal Sites in Louisiana and in Arkansas," the results of his archæological investigations of 1912-13. He covered ground previously unexplored by archæologists, but unfortunately the finds were very meagre and on the whole uninteresting, partly because the area in question is subject to floodings, and therefore the destruction or the impairment of mounds is not permissible. Nevertheless, the district had to be investigated in order to complete the scheme which Mr. Moore has imposed on himself, despite the fact that he knew he would be unlikely to get many specimens. It is this attitude of mind, the patient accumulation of data irrespective of their intrinsic worth and disregard of sensational results, that gives Mr. Moore a distinguished place among archæologists. Many of the mounds are quadrangular, with the sides facing the cardinal points, frequently they are about 15-20 ft. in height, and have a square flat summit, sometimes 100 ft. or more in diameter. In addition to the usual wealth of excellent figures of pottery, etc., there are two coloured plates, one of a large effigy-pipe of earthenware, the other of irregular earthenware objects of unknown significance. Those that are biconical may have been used in the "hand-game," a gambling game universally spread over North America, possibly some of the other objects may have been used for similar purposes; at present they remain a mystery. The memoir closes with a short report on a collection of crania and bones by Dr. A. Hrdlička. The skulls were slightly deformed artificially, and "are remarkably like the less narrow type of crania among the Siouan people and the more southern Iroquois."

THE Milk and Dairies Bill passed the second reading on June 9. On the whole a favourable opinion was expressed with regard to it, though Mr. Astor thought there was a real fear that it might seriously diminish the quantity of milk available, and so tend to increase its price. He also urged the grading of milk.

THE annual report of the superintendent of the Brown Institution (Mr. F. W. Twort) has been issued. Some 6000 animals were brought to the institution, of which 565 were treated as in-patients. In addition to its hospital, important research work is carried out in the laboratories of the institution—investigations on Johne's disease of cattle, by Dr. C. Twort; the functions of the thyroid gland, by Mr. Edmunds; infantile diarrhoea, by Dr. Mellanby and the superintendent, etc.

As is well known, those engaged in occupations in which much siliceous dust is produced (*e.g.* potters, certain miners, etc.) suffer from a form of lung disease. Dr. McCrae has analysed the lungs from such cases occurring in the Witwatersrand mines, South Africa. He finds that from 2.8 to 9.6 grams of silica may be present, compared with 0.55 gram in a normal lung. Microscopical examination of the siliceous particles showed them to be angular, and the majority have a diameter of less than $1\ \mu$ (South African Institute for Medical Research, 1913).

WE have received from the publisher, Mr. Gustav Fischer, Jena, "Studien zur Pathologie der Entwicklung" (Band i., Heft 3, 1914), edited by Profs. R. Meyer and E. Schwalbe. The principal contribution is by Dr. L. Kech on the morphology of the musculature of the human extremities when defective (pp. 428–539), containing a summary of published examples. Abstracts of papers published elsewhere, as well as original communications, are included in the volume, which should be of considerable service to those engaged in this branch of research.

A REPORT of the work of the Radium Institute for the year 1913, by the director, Mr. Hayward Pinch, has been issued. In all, 860 cases have been treated, of which about half were cases of cancer. A number of the latter improved more or less, but it is too early yet to determine whether they be cured or not. It would seem that in cases of cancers of the skin the outlook is very hopeful, but that in tumours of the tongue and mouth it is less hopeful—though the method of burying the radium tube in the tumour has been successful in some cases. Tumours of the womb yield gratifying results, of the breast fair results. Intestinal tumours, though difficult to reach, do well in a relatively small number of cases. Tumours of bone, if taken early, do well. In most cases pain and irritation are relieved. Besides the direct application of radium in the institute, tubes of radium emanation and radio-active water are supplied for use outside.

In his report for 1913 the curator states that the Sarawak Museum has made steady progress, the number of additions during that year being above the average, and articles based on the collections more

numerous than usual. The crying need of the moment seems to be the expansion and (when necessary) description of the large collection of Bornean beetles.

WITH its June issue the *Entomologist's Monthly Magazine* celebrates its jubilee, the first number, under the editorship of Messrs. Stainton, McLachlan, Rye, Blackburn, and Knaggs, having appeared in June, 1864. Of the contributors to the first volume, eight well-known entomologists—Messrs. A. G. Butler, F. Enock, C. Fenn, G. Lewis, G. B. Longstaff, G. F. Mathew, D. Sharp, and G. O. Waterhouse are still with us to testify to the healthfulness of "butterfly-hunting." Since its commencement, the magazine has added no fewer than 2992 species to the British fauna.

LICE (Anoplura) and biting-lice (Mallophaga) infesting mammals form the subject of an article in the May issue of the *American Naturalist* by Prof. V. L. Kellogg, of Stanford University, Colorado. In a previous communication on the Mallophaga of birds it has been shown that the evidence of these parasites frequently confirms that of other factors in respect to the near affinity between hosts that are widely sundered geographically. Similar evidence is afforded by the study of the mammal-infesting types, the author remarking that, in spite of the incompleteness of our knowledge, "it is surprising how repeatedly the commonness of parasite species to two or more related, although geographically well separated, host-species is illustrated. All through the order (*i.e.*, class) from Marsupials to Quadrumana this condition is again and again exemplified."

As the result of collecting trips in the Middle and Far East, followed by technical work in the chief museums of Europe, Mr. C. W. Beebe has evolved a scheme of classification of the pheasants and their relations, based on the order in which the tail-feathers are moulted, a feature he believes to afford the most trustworthy indication of genetic affinity. In this he is in agreement with the work of Dr. Bureau on the tail-moult in partridges, although he was unacquainted with those researches until his own were nearly completed. On this basis Mr. Beebe (whose article appeared in the April issue, vol. i., No. 15, of *Zoologica*) divides the pheasant family (Phasianidæ) into four sub-families. In the first of these (Perdicinæ) the tail-moult commences with the inner pair of feathers, while in the second (Phasianinæ) the outermost pair are the first to be shed; in the other two sub-families an intermediate condition exists.

A NEW method for determining the densities of minerals and rocks at high temperatures is described by A. L. Day, R. B. Sosman, and J. C. Hostetter, in the *American Journal of Science*, vol. xxxvii. (1914), p. 1. The substance is held down by weights under an inverted crucible of graphite, which is immersed in a bath of molten tin or silver. Tin has the conveniently low melting point of 232° . The measurements are made by noting the weight required to pull down the crucible and the assay to a given depth marked on a stem connected with the crucible. The graphite is protected from oxidation by an atmosphere

of nitrogen and carbon monoxide. The density-curve of the metal used and the expansion-coefficient of graphite are, of course, factors in the calculation of the results. One of the most interesting of these is that as the temperature (575°) at which α -quartz passes into β -quartz is approached, a striking increase occurs in the rate of expansion.

THE area of German East Africa to the south-east of the Victoria Nyanza and south of the frontier of British East Africa was explored in 1906-7 by Prof. Fritz Jaeger, Professor of Colonial Geography in Berlin, and his report on the Riesenkrater Highlands includes a detailed account of the interesting area which he investigated. It has been issued in the *Mitteilungen aus den Deutschen Schutzgebieten, Ergänzungsheft*, No. 8 (1913, 4to, 213 pp., 12 pl., 3 maps). The most interesting general problem in the area is the course across it of the Great Rift Valley of East Africa. The western wall of this valley continues southward, forming the western scarps above lakes Magadi, Manyara, and Balangda; but the eastern wall disappears in a wide volcanic belt which extends westward from the extinct volcanoes of Kilima Njaro, and Meru. In the same district a series of faults branches off from the western wall of the Great Rift Valley and trends south-westward; these faults give rise to a series of rift valleys of which the largest includes the plains of Wembere and Lake Njarasa; a smaller one, Prof. Jaeger has called the Hohenlohe-Graben. These valleys may be really off-branches, and the main valley probably continues southward; its eastern wall may be represented by some faults, with a throw of more than 600 ft., which lie along the southern extension of the eastern side of Lake Manyara. The memoir includes a detailed account of the volcanic highlands to the north and west of Lake Manyara, which Prof. Jaeger has called the Riesenkrater Hochland.

R. E. LIESEGANG'S suggestions and experiments as to the osmotic deposition of concentric coats in chemical and mineral aggregates have received considerable attention among geologists, and notably from Mr. G. Abbott (*NATURE*, vol. xcii., pp. 607 and 687). Mr. Abbott has now published in the *Pioneer* (March 20 and 27, 1914) a further study of the discoid limestones which simulate organic characters in the concretionary beds of Permian age at Sunderland, and suggests that we must not ignore processes of mineral growth "even in the evolution of well-known organisms, such as corals." We must not, he urges, "remain blind to what the alkaline earths *can* of themselves do in the formation of the skeletons of higher structures, in the roll of living things." Mr. E. A. Martin, Hon. Curator of the Museum of the Borough of Croydon, South Norwood, writes to us on the same subject, pointing out that the secretion of carbonate of lime or silica by marine organisms may be "immensely assisted by the osmotic action which Mr. Abbott believes to have been the cause of the discoid and coralloid growths of the limestones of Fulwell Hill." "Has this, too," he asks, "anything to do with the reason why some

shells are spiral, discoidal, bivalve, and so on?" Here the question appears to be one for the zoologist, who may be able to indicate a cause in the grouping of the soft parts of the animal, by which the external skeleton is controlled.

A FIRST communication on the motion of the air in the lowest strata of the atmosphere, by Prof. G. Hellmann, appeared in the *Sitzungsberichte* of the Prussian Academy of Sciences of April 2. As pointed out by the author, of all the meteorological elements determined by instruments, none lacks comparability between one place and another like wind velocity. This is due to some extent to instrumental defects, but more particularly to the extraordinary differences of exposure, especially height above the ground. Experiments are being carefully made by the Berlin Meteorological Institute at heights of 2, 16, and 32 metres, the results of which show an annual mean increase in velocity of 48 per cent. between 2 and 16 metres, but only 14 per cent. between 16 and 32 metres; it is proposed to erect additional instruments at greater heights. Little variations in the increase of velocity with height were found to exist during the monthly periods, except at the lowest level, owing to friction with the surface. Some very interesting and unexpected results are referred to with respect to the completely opposite behaviour of the daily range of velocity in light and strong winds. The systematic study of the vertical wind components, such as those now in question, is of great importance at the present time.

IN the May number of the Proceedings of the American Academy, Dr. Louis Bell gives an account of an investigation of the types of abnormal colour vision he has commenced with the aid of the Rumford Fund. His spectroscopic apparatus allows him to classify his cases very rapidly. It depends on matching a synthetic yellow and a synthetic blue-green, which lie at the points of intersection of the red-green and the blue-green sensation curves for the normal eye, by a pure spectrum which occupies the lower, while the synthetic colour occupies the upper half of the field of view. Of the twenty-six types of abnormality, Dr. Bell has already investigated the six possible types characterised by deficiency or excess of sensitivity to one of the three fundamental colours, five of the twelve possible cases in which two of the fundamental sensations are affected, and four of the eight possible cases in which three of the sensations are abnormal. He points out that the direction in which we must look for remedial measures is that of reducing the stronger sensation or sensations by means of coloured spectacles till the three are in the normal ratio. This can only be done in the deficiency cases at the expense of the general luminosity.

PART 3 of vol. iii. of the Science Reports of the University of Sendai, Japan, contains two important magnetic papers. The first, by Messrs. K. Honda and Y. Ogura, deals with the relation between the changes with temperature of the electrical resistances and the magnetic susceptibilities of iron, steel, and nickel. The materials were tested in the form of wires about a metre long and a

millimetre in diameter. The magnetic field of about 160 was produced by coils, and the magnetisation measured by the magnetometer method up to temperatures of 800° or 900° C. The results show that the changes of conductivity and susceptibility occur together, and that both are due to gradual changes of the properties of one of the phases rather than to any change of phase of the constituents. The second paper, by Messrs. H. Takagi and T. Ishiwara, gives the susceptibilities of a large number of minerals and igneous, aqueous, and metamorphic rocks, tested by the non-uniform field method up to fields of 2600. In general, igneous rocks are strongly paramagnetic, and their susceptibilities decrease with the field, while the other rocks are weakly paramagnetic or diamagnetic, and their susceptibilities nearly independent of the field.

BULLETIN No. 42 of the experiment station of the Hawaiian Sugar Planters' Association contains an account by Mr. Noël Deerr of an experimental study in multiple effect evaporation. From these experiments it appears that the temperature difference in the first cell is a rough index of the rate of evaporation, and that the vapours in a multiple effect evaporator are superheated. The heat economy of quadruple effect evaporators as found in practice compared with a computation on ideal lines lay between 0.8 and 0.9, the latter figure being obtained with well protected, and the former with unprotected, or badly protected apparatus. A vertical submerged tube apparatus with 5-lb. gauge pressure in cell No. 1 (227° F.), and not less than 26.5 in. vacuum in the last cell (127° F.) should evaporate not less than 9 lb. of water per sq. ft. an hour, with juice entering at 212° F., and should evaporate 4.2 lb. of water per lb. of steam. If these results are not realised, foul heating surfaces, too slow evacuation of condensed waters, or incondensable gases may be looked for. A horizontal tube film evaporator had a much greater rate of evaporation than vertical submerged tube evaporators.

THE recent pronouncement of Sir Percy Scott that the importance of submarines has not been fully recognised, and that it has not been realised how completely their advent has revolutionised naval warfare forms the subject of articles in *Engineering* and the *Engineer* for June 12. Sir Percy has said that, in his opinion, as the motor vehicle has driven the horse from the road, so has the submarine driven the battleship from the sea. These statements have encountered a good deal of criticism, and neither of our contemporaries advocates the interpretation that we should discontinue the building of battleships. It cannot be said that Sir Percy has adduced convincing reasons for the complete change in naval policy which he advocates. It has not been established that the torpedo, practically the only weapon of the submarine boat, would be effective. Again, the radius of action of such boats when submerged is very limited, not much more than one hundred miles, so that in taking a considerable voyage they would have to proceed "awash," and would then be subject to attack by torpedo-boat destroyers and other surface craft, and by aerial vessels.

MEMBERS of the British Association about to proceed to Australia for the meeting in August next, and students of geography generally, should examine the large scale map of Australia just published by Messrs. G. W. Bacon and Co., Ltd. The size of the map is 72 in. by 56 in., and it can be had in four sheets, mounted to fold in neat cloth case for the bookshelf, at the price of 25s. The map is constructed on Clarke's Perspective Projection, and the scale is 1 : 2,500,000, or 39.5 miles to the inch. Rivers, lakes, and similar physical features, are shown and named in blue, while black type is used for place-names, mountains, and so on. Roads, tracks, and telegraph lines are marked in red. Inset maps on the same scale are provided of Tasmania and Papua. The map is also published mounted on cloth with rollers, in which form it will prove very useful in the office and study.

MR. S. J. BARNETT writes from the Ohio State University, U.S.A., to say that the word "size" in the penultimate line of the second column of p. 109 of the current volume of NATURE, on which a letter from him is printed, should be "sign." We have examined Mr. Barnett's original MS., and in view of the indistinct character of the handwriting understand how the misprint occurred.

OUR ASTRONOMICAL COLUMN.

THE NEW ZEALAND SOLAR OBSERVATORY.—In an address to the members of the Wellington Philosophical Society, by the president, Dr. C. Monro Hector, the subject dealt with was the present state of affairs as regards the Cawthron Solar Observatory. Referring first of all to the approval of all the leading authorities in both Europe and America for the establishment of such an observatory, he points out the suitability of the neighbourhood of Nelson as the site. The records show that this region has 20 per cent. more sunshine and 33 per cent. less rain than at the Kodaikanal Observatory in India. Several excellent sites about Nelson are available, but that on the Port Hills, within easy reach of the town, has so far proved the best from an observational point of view; if this be eventually selected, it will be a means of saving much money in initial outlay and running expenses. Mr. Thomas Cawthron has promised the 50,000l. for a beginning, being the estimated minimum for establishing the observatory on a continuous and permanent basis; a suggested deed of trust has been drawn up, and a suggested board of trustees has been submitted to him and approved. The proposed constitution of the board is as follows:—Mr. Thomas Cawthron, one member nominated by each of eight institutions, the Government Astronomer, and two others elected by the rest of the board.

THE POSITIONS OF VARIABLES AND ASTEROIDS DISCOVERED AT THE LOWELL OBSERVATORY.—Bulletin No. 61 of the Lowell Observatory contains a communication by Mr. C. O. Lampland with reference to the positions of variables and asteroids discovered on photographs of star fields taken with the 40-in. reflector of the Lowell Observatory. During the past year about 800 negatives have been made and examined, and measures were made with a Zeiss comparator equipped with a Blink Mikroskop. All the areas were photographed in duplicate, and the exposures were from two to three days apart on the average. The settings at the telescope were made on